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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application Number: 10/007,816
Filing Date: November 09, 2001
Appellant(s): FRANKEL ET AL.

Lawrence J. Merkel
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed May 08, 2006 appealing from the Office action mailed November 30, 2005.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is incorrect because the rejections of claims 11, 13-19, 28, 30, and 37 are withdrawn. A correct statement of the status of the claims is as follows:

This appeal involves claim 1-6, 10, 13-25, 27, 29, and 31-36.

Claims 11, 28, 30, and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 13-19 are allowed.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

**WITHDRAWN REJECTIONS**

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner.

The rejections of claims 11, 13-19, 28, 30, and 37 have been withdrawn.

The rejections of claims 1, 20, and 31 under 35 USC 103(a) as being unpatentable over Preiss have been withdrawn.

The rejection of claim 29 under 35 USC 102(b) as being anticipated by Ulrich has been withdrawn.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

8.1 Ulrich et al (US Patent 5,466,200) ("Ultich");

8.2. Smallmo (US Patent 6,289,398 B1) ("Smallmo");

8.3. Preiss, Bruno,"The Yaddes Distributed Discrete Event Simulation Specification Language and Execution Environments", 1989, p1-24;

8.4 ANL.gov, "Modular Design Review", 1995, http://www-unix.mcs.anl.gov/dbpp/text/node40.html;

8.5 TFHRC.gov, "Developing a Verifiable System", 1998, http://web.archive.org/web/19980205012202/http://tfhrc.gov/advanc/vve/vve2.htm;

8.6 Damani, O.P.; Garg, V.K., "Fault-tolerant distributed simulation," Parallel and Distributed Simulation, 1998. PADS 98. Proceedings. Twelfth Workshop on, vol., no.pp.38-45, 26-29 May 1998.

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

9.1 Claims 1, 20 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Damani et al.

As per claim 1, Damani discloses distributed simulation system comprising:

two or more computer systems configured as a plurality of nodes arranged to perform a simulation of a system under test **(section 1, paragraph 1, lines 1-5)**, wherein

the plurality of nodes are configured to communicate simulation commands and signal values for the system under test using message packets transmitted between the plurality of nodes **(section 3, lines 4-6)**, and

at least one logging node of the plurality of nodes is configured to log the message packets in one or more log files on at least one non-volatile storage medium during the simulation **(section 2, paragraph 2, lines 1-5)**, wherein

the at least one logging node is separate from nodes targeted by the message packets **(Abstract last 4 lines)**.

As per claims 20 and 31 note the rejection of claim 1 above. The Instant claims are functionally equivalent to the above-rejected claims and are therefore rejected under same prior-art teachings.

9.2 Claims 1, 6, 10, 20, 25, 27, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Ulrich et al (US Patent 5,466,200).

As per claim 1, Ulrich discloses a distributed simulation system comprising:

two or more computer systems configured as a plurality of nodes arranged to perform a simulation of a system under test **(column 2, lines 8-15 and lines 26-30)**,

wherein the plurality of nodes are configured to communicate simulation commands and signal values for the system under test using message packets transmitted between the plurality of nodes **(column 2: lines 8-15 and lines 26-30, column 10: lines 26-29)**,

and at least one logging node of the plurality of nodes is configured to log the message packets in one or more log files on at least one non-volatile storage medium during the simulation **(column 3: lines 45-49, column 8: lines 27-28; col.: 4 lines: 62-65; col 4 lines 28-29)**,

wherein the at least one logging node is separate from nodes targeted by the message packets **(Figure 8 and 9)**.

As per claim 6, Ulrich discloses a distributed simulation system as recited in claim 1 wherein

the logging node is a hub of the distributed simulation system **(column 3: lines 45-49, column 8: lines 27)**.

According to Ulrich's disclosure the log file resides on a computer storage medium such as disclosed on **(col.: 4 lines: 62-65; col 4 lines 28-29)**, which is also included in the hub. Thus, when the hub mentioned by Ulrich sends information to –or– receives information from other nodes, the hub writes the information to medium and hence is using a log file. Therefore, the hub of the distributed simulation system is logging the message packets.

As per claim 10, Ulrich discloses a distributed simulation system as recited in claim 1 wherein

the logging node is a distributed control node **(column 8, lines 27-28; col.: 4 lines: 62-65; col 4 lines 28-29)**.

As per claims 20, and 31, note the rejection of claim 1 above. The Instant claims are functionally equivalent to the above-rejected claim and are therefore rejected under same prior-art teachings.

As per claims 25 and 27, note the rejection of claims 6 and 10 above, respectively. The Instant claims are functionally equivalent to the above-rejected claims and are therefore rejected under same prior-art teachings.

***Claim Rejections - 35 USC § 103***

9.3 Claims 2-5, 21-24, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Damani et al as applied to the rejection of claim 1 above in view of Stallmo (US Patent 6,289,398 B1).

As per claim 2, Damani does not explicitly teach the limitation, if a first node of the plurality of nodes fails during the simulation, the distributed simulation system is configured to establish a second node, and wherein a third node of the plurality of nodes is configured to read message packets that were transmitted to the first node from the log file and to transmit the message packets to the second node. However, Stallmo teaches that data logged/stored on a failed node shall be rebuild on a spare new node, wherein such new node will replace the failed node **(column 15, lines 52-56)**. Therefore, it would have been obvious to one of ordinary skill in the art to build a distributed computing environment such as that taught by Damani with the mentioned attributes. Stallmo's teachings would have allowed users of Damani's system to enjoy increased stability, fault-tolerance and availability of the distributed network.

As per claim 3, Damani discloses a distributed simulation system as recited in claim 2 wherein

the distributed simulation system is configured to pause the simulation prior to transmitting the message packets to the second node **(section 1, lines 1-5)**,

and wherein one of the plurality of nodes is configured to resume the simulation subsequent to transmitting the message packets from the log file to the second node **(section 1, column 2, lines 23-26)**.

Damani teaches that at the time of the failure the system will: halt/pause, recover from the failure, then restart/resume operations.

As per claim 4, Stallmo teaches of a distributed system wherein a warm spare, second node, is configured to detect data, message packets, in a log file which were sourced by a failed device, first node, wherein the warm spare is further configured to verify that the warm spare transmits the failed device's message packets (column 15: lines 65-67, column 16: lines 1-14, lines 16-22).

As per claim 5, Damani disclose a distributed simulation system as recited in claim 2 wherein

the second node is configured to load a simulator state corresponding to a simulation checkpoint (section 2, paragraph 2, lines 3-5),

and wherein the third node is configured to transmit, to the second node, message packets that were transmitted to the first node if the message packets occurred after the simulation checkpoint (section 2, paragraph 2, lines 3-5),

and wherein the third node is configured not to transmit, to the second node, message packets that were transmitted to the first node if the message packets occurred prior to the simulation check point (section 2, paragraph 2, lines 3-5).

As per claims 21-24, and 32-35, note the rejection of claims 2-5 above. The Instant claims are functionally equivalent to the above-rejected claims and are therefore rejected under same prior-art teachings.

9.4 Claims 29 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Damani et al as applied to the rejection of claim 20 above in view of ANL "Modular Design Review".

As per claim 29, Damani discloses all limitations of claim 20. Damani discloses transmitting the packets to the first node (as above rejected). Damani however does not specifically disclose read message packets from a log file that were transmitted during a the simulation of a first portion of a system under test of a particular portion of a system under test, excluding other portions of the system under test. ANL however discloses an analogous system having the said features **(page 1 paragraph 1, 4; page 2 last three lines)**. It would have been obvious to one of ordinary skill in the art <programming /

modular design> at the time of Applicant's invention to combine the teachings of the two references in order to facilitate code reusability **(ANL page 3 middle paragraph, page 1 paragraph 2)** and faster reduce the time required to perform a project therefore save time and money.

As per claim 36, note the rejection of claim 29 above. The Instant Claim is functionally equivalent to the above-rejected claim and therefore rejected under same prior-art teachings.

**(10) Response to Argument**

10.1 It should be noted that in some cases there are multiple rejections applied to the same independent claim. This was done in order to reject the dependent claims under 35 USC 102, rather than 35 USC 103.

10.2 **Appellants argue claims 1, 20, and 31 as a group and argue primarily that:**

10.2.1 "[...] Damani does not teach or suggest 'the at least one logging node is separate from nodes targeted by the message packets'."

10.2.2 "The Office Action mailed July 19, 2005 ("Office Action") asserts that Damani teaches message logging in section 2, paragraph 2, lines 1-5. These teachings are: 'To avoid both synchronization and domino effect, some schemes also save the received messages on stable storage. This is called *message logging*. After a failure, a process restores its last checkpoint and replays the logged messages' (emphasis in original)."

10.2.3 "If anything, the last sentence quoted from Damani above implies that the process that is performing the simulation does the logging for that process." **(Appeal Brief filed May 08, 2006 ("Brief"): page 5 paragraph 2)**

10.3 **Examiner's Answer:**

10.3.1 As previously presented in Office Action mailed July 19, 2005 ("Office Action"), the limitation "wherein the at least one logging node is separate from nodes targeted by the message packets" are taught by Damani on **(Abstract last 4 lines)**, and reiterated within the Appellants-cited section quoted above (section 10.2.2 above). Specifically, the limitation requires that the logging node is separate from the nodes targeted by the message packets. Logical Processes (LPs)

correlate to nodes. Furthermore, as interpreted by Appellants, LPs perform their own logging (see section 10.2.3 above). LPs are grouped into separate clusters. Therefore, two LPs could be two clusters. The limitation, as recited, and when given its broadest and most reasonable interpretation as required by MPEP 2111 require that there is at least one logging node that is separate from the nodes targeted by the message packets. Given that fact, when the message packets are logged by each node, they are inherently not targeted to the other node that is also performing the logging.

10.3.2 The same reasoning as presented above is applied to Appellants' arguments with respect to claims 20 and 31.

10.4 **Appellants argue claims 1, 20, and 31 as a group and argue primarily that:**

10.4.1 "[...] Appellants submit that Ulrich's storing of messages in memory does not each (sic) or suggest "log the message packets in one or more log files on at least one non-volatile storage medium" as recited in claim 1." (emphasis added in original) **(Brief: page 7 last paragraph)**

10.4.2 "Additionally, Ulrich's 'nodes' are exercise machines, and the "simulation" of Ulrich is relating to providing a simulated environment for the users of the exercise machines. This has nothing to do with simulating a system under test, as recited in claim 1" (emphasis added in original) **(Brief: page 7 last paragraph)**

10.4.3 "The Response to Arguments section of the Final Office Action asserts that Ulrich teaches "at least one logging node of the plurality of nodes is configured to log the message packets in one or more log files on at least one non-volatile storage medium" at col. 4, lines 62-65 and col. 4, lines 28-29. However, col. 4, lines 59-65 of Ulrich teach "Regardless of the type of microprocessor employed, the computer typically also includes one or more electronic storage devices for storing one or more data bases which describe the simulated environment(s), The storage devices can include CD-ROMs, hard disk drives, floppy drives, read only memories (ROMs), or random access memories (RAMs)." **(Brief: page 8 first paragraph)**

10.4.4 "Such databases are not message packets [that communicate simulation commands and signal values". **(Brief: page 8 first paragraph)**

10.4.5 "Thus, the electronic system is not the system under test, but rather is the system that is performing the simulation (of a pedaled vehicle, such as bicycle, which is not an electronic system)." **(Brief: Page 9 first paragraph)**

10.5 **Examiner's Answer:**

10.5.1 Appellants' Specification page 4 lines 6-9 should be noted. Specifically, the Appellants have, with reasonable clarity, deliberateness, and precision—as required by MPEP 2111.01 III—defined in the Specification "[T]he electronic system being simulated will be referred to as the 'system under test'" **(Specification: page 4 lines 6-9)**

10.5.2 Ulrich discloses a **distributed simulation of an electronic system (exercise bikes) and environment having electronic inputs (pedals) and electronic outputs (screen output)**. Ulrich's system is equivalent to the one the Appellants regard as their own. Ulrich's system comprises each and every element that is claimed and is used in order to simulate an electronic system (system under test by Appellants' definition), which is clearly defined in **(Specification page 4 lines 6-9, see section 10.5.1 above)**. The system under test is defined to be an electronic system being simulated. The exercise bikes disclosed by Ulrich are electronic systems being simulated in a distributed manner.

10.5.3 Attention is drawn to Ulrich, **(col: 8 line: 25-40)**, which discloses:

> "In the simulated environment, each user can be depicted with a unique (three-dimensional) icon, picture, or other symbol. During the simulation, the same environment database is stored and executed on each machine #1. "Each computer is responsible for updating the environment so that its user sees herself (or himself) in relation to all other networked users #2. The desired simulation typically is selected by agreement of all interested users on the network prior to the start of the group simulation. After selection, that environment's database is transferred between computers (over the link 94) so that each computer can execute the same environment and participate in the group simulation. Typically, each computer has a permanent copy of the selected simulation environment stored #3 therein and thus does not

> need to receive it over the link 94." (emphasis and emphasis number added)

10.5.4 Figure 11 item 134 discloses "send database of simulated 3D environment". The 3D environment is stored on a non-volatile medium (as agreed upon by Appellants and seen in emphasized section #3 above). The 3D environments are message packets **(See Figure 13 items 158, 160, and particularly items 164 and 166 which discloses that the databases are broken into a group of packets, which is the same way they are read and stored on the non-volatile medium).**

10.5.5 Ulrich's simulation comprises swapping simulating environments as message packets and saving them on as permanent copies (non-volatile). The simulating environments comprise data that incorporates the actions of the user, i.e. pedaling speed, direction, etc. Therefore, they are simulation signal values (magnitude of the speeds / directions) and commands (go/stop).

10.5.6 Furthermore, the exercise bicycle is an electronic system, as *admitted by Appellants* (section 10.4.5 above), and therefore it is a system under test (see section 10.5.1) in accordance with the interpretation of "system under test" as discussed in section 10.5.1 above.

10.5.7 The same reasoning as presented above is applied to Appellants' arguments with respect to claims 20 and 31.

10.6 **Appellants argue claims 6 and 25 as a group and argue primarily that:**

10.6.1 "[C]laims 6 and 25 each recite combinations of features including 'the logging node is a hub of the distributed simulation system'. The Final Office Action alleges that Ulrich teaches the above features at col. 3, lines 45-49 and col. 8, line 27." **(Brief page 10 section "Claims 6 and 25" paragraph 1)**

10.6.2 "At col. 3, lines 45-49, Ulrich indeed teaches a hub. However, no teaching is provided that the hub is a logging node. Col. 8, line 27 discusses each node updating an environment database." (emphasis in original) **(Brief page 10 section "Claims 6 and 25" paragraph 2)**

10.7 **Examiner's Answer**

10.7.1 The hub does log the message packets, as discussed earlier in section 10.5.3 to 10.5.5, and further expanded upon in Ulrich **(col: 11 line: 45-49)**, which discloses: "If it is an update, the hub records the new state of the user's icon/object (step 170) by referencing an externally or internally maintained object database 172 which contains the location, etc. data on all users in the environment." (emphasis added)

10.8 **Appellants argue claims 10 and 27 as a group and argue primarily that:**

10.8.1 "... Appellants respectfully submit that each of claims 10 and 27 recite additional combinations of features not taught or suggested in Ulrich. For example, claims 10 and 27 each recite combinations of features including "the logging node is a distributed control node"" **(Brief: page 10 last paragraph)**.

10.9 **Examiner's Answer**

10.9.1 Section 10.5.3 quotes "During the simulation, the same environment database is stored and executed on each machine #1" (emphasis added) **(col: 8 line: 25-40, in part)**. The distributed control node correlates to the "each machine".

10.10 **Regarding claims 11 and 28:**

10.10.1 The rejections to the Instant Claims have been withdrawn because the recited limitations in combination with intervening limitations are allowable. Therefore, The Instant Claims are being objected to as being dependent upon a rejected base claim, thus rendering the arguments moot.

10.11 **Regarding claims 13-19:**

10.11.1 The rejections of the Instant Claims have been withdrawn. The Instant Claims are allowable over prior art of record. The most relevant prior-art of record is Preiss (presented in Final Office Action). Preiss does not recite the features as disclosed in the specification and recited in the claims.

10.12 **Appellants argue claims 2, 5, 21, 24, 32, and 35 as a group and argue primarily that:**

10.12.1 "Stallmo's process of rebuilding data from a failed storage device and writing it to a warm space does not teach or suggest "a third node of the plurality of nodes is configured to read message

packets that were transmitted to the first node from the log file and to transmit the message packets to the second node". Rather, the data is generated, or read, from other storage device (depending on the configuration) and written to the new storage device. This is not the same as reading message packets that were transmitted to the first (failed) node and transmitting those message packets to the second node." (emphasis in original) **(Brief: page 16 last 2 lines to page 17 first paragraph)**

10.13 **Examiner's Answer**

10.13.1 Stallmo has a failed device (first node) which contains data that was forwarded to it in a redundancy write. Once the first node fails, the controlling MCU (third node) updates the write MCU. The write MCU is the warm spare (second node). This is expanded upon by Stallmo on **(col: 16 line: 36-51)**, which recites:

"In a RAID 1, 3, 4, or 5 implementation of the present invention, a write operation proceeds when a host bus command is transmitted from the host computer 201 via the host bus 207 to a controlling MCU 203. Once the host bus command is received by an MCU 203 that accepts the task of controlling the operation, that MCU 203 determines which of the other MCUs 203 are involved in the write operation by from the logical system configuration data structure. The involved MCUs 203 are those MCUs which are coupled to data storage devices 209 to which data is to be written (referred to as "write" MCUs), or which are in the same redundancy group as those data storage devices 209 to which data is to be written (referred to as "redundancy" MCUs). The controlling MCU 203 communicates with each of the write MCUs 203 by sending a "read old data" message on the serial communications link 212."

10.14 **Appellants argue claims 3, 22, and 33 as a group and argue primarily that:**

10.14.1 "Appellants respectfully submit that each of claims 3, 22 and 33 recites additional combinations of features not taught or suggested in Damani in view of Stallmo. For example, claim 3 recites a combination of features including "resuming the simulation subsequent to transmitting the message packets from the log file to the second node".

10.15 **Examiner's Answer:**

10.15.1 Attention is drawn to Damani's section 2 paragraph 2, which recites, in part: "

10.15.1.1 "To avoid both synchronization and domino effect, some schemes also save the received messages on stable storage. This is called *message logging*. After a failure, a process

restores its last checkpoint and replays the logged messages. It may inform other processes about its failure and may also request some information from other processes." (emphasis in original)

10.15.2 The section quoted above details that the process will restore the simulation after a failure based on the checkpoint (log file / message logging).

10.16 **Appellants argue claims 4, 23, and 34 as a group and argue primarily that:**

10.16.1 "Appellants respectfully submit that each of the claims 4, 23, and 34 recites additional combinations of features not taught or suggested in Damani in view of Stallmo. For example, claim 4 recites a combination of features including "the third node is configured to verify that the second node transmits corresponding message packets".

10.17 **Examiner's Answer:**

10.17.1 Stallmo expands on the feature on **(col: 16 line: 21-24)**, which recites in part: "[...] the target MCU then tests to see whether the data from the rebuilt MCU is next in sequence to be transferred to the host computer 201 (STEP 710)".

10.18 **Regarding claims 1, 20, and 31 as being unpatentable over Preiss:**

10.18.1 The rejections to the Instant Claims over Preiss have been withdrawn, thus rendering the arguments moot.

10.19 **Appellants argue claims 29 and 39 as a group and argue primarily that:**

10.19.1 "[...] ANL is describing writing code in a modular fashion, such that the components can be plugged in together and reused in other programs. "

10.19.2 "This has nothing even remotely to do with simulating a system under test, nor of reading message packets from a previous simulation and transmitting those packets in a current simulation, as highlighted above." (emphasis added) **(Brief: page 22 last paragraph to page 23 first paragraph)**

10.20 **Examiner's Answer:**

10.20.1 Damani in view of ANL disclose a simulation of a system under test **(Damani: Abstract paragraph 1)**.

10.20.2 The claims do not require a "previous simulation" as argued by Appellants. This feature is not claimed in either claim 29, or 39.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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